

STUDIES IN THE THEACEAE, XXXIII
VARIATION IN THE FRUIT OF *TERNSTROEMIA*
KWANGTUNGENSIS

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COMPLETE DIAGNOSES of taxa in the genus *Ternstroemia*, like those of any other genus, should include the descriptions of both flowers and fruit. Considering that the flowers of this genus are either dioecious, androdioecious, or occasionally hermaphroditic and that flowers seldom are collected at the same time as the fruit, one may see how inadequate a description based on a single herbarium specimen must be. In the species discussed below the flowers are still unknown. The fruiting material available to the original authors (two names are involved) was insufficient for a complete diagnosis of the fruit. However, it so happens that in *Ternstroemia kwangtungensis* the leaf characters seemed outstanding enough at the time of its description to set it apart from all other Chinese members of the genus. The fruit is widely variable, and it is with this extreme and unusual variation, in contrast to the uniformly 2-loculate condition of most other Asiatic species, that the present paper is concerned.

In 1918, E. D. Merrill described an interesting new species of *Ternstroemia* from Kwangtung Province, China, as *T. kwangtungensis*. He obviously never realized at the time — or later — how distinct and unusual the species actually would turn out to be. The type collection was made by Merrill himself, and, although it was a rather wretched specimen, Merrill with his keen eye for novelties recognized it as different from any *Ternstroemia* previously described from China. What attracted Merrill, I am sure, was the heavy, subrotund, shiny, coriaceous leaves and the broad, very thick petioles, with the overall appearance of a stiff fan or paddle. The fruit was immature, and as such he dismissed this character. Since then several workers have identified Kwangtung material in the Arnold Arboretum herbarium as belonging to this species, but, upon close observation, none of the specimens truly resembles Merrill's isotype which had been deposited at the Arnold Arboretum.

Since the isotype available (*Merrill 11013*) was so sparse (one attached and one unattached immature fruit) I had hesitated to dissect the material until absolutely necessary. However, when a dissection was finally made of the unattached fruit I discovered that it was so very young in development that it was still in the advanced ovulate stage.

There were five locules. However, of these, only three were fertile and contained respectively three, two, and two ovules. The inside surface at the apex of the locules where the ovules were attached was dark red, smooth, and shiny. In the two intervening spaces (or sterile locules) such was not the case, these being filled with spongy tissue. Two of the

fertile locules were adjacent to each other and were separated by a single septum. On each side of these two adjacent fertile locules was a sterile locule with the third fertile locule between the two sterile locules. It is quite likely that in the maturation of the fruit the fully developed seeds may fill the fruit completely, thereby eliminating the sterile locules, for in this genus it is not unusual to find that the septa separating the locules have been broken down by the developing seeds.

A second specimen which appeared to belong to this species, *Tsang* 25486, was found among our unidentified material. This specimen also had only two fruits. A single dissection of a fruit of this second specimen showed it to be 3-loculate with the three locules clearly taking up the entire fruit, with no intervening spaces. The seeds numbered seven and were arranged four, two, and one in the three locules.

A short while ago, I was surprised to find that H. T. Chang (Zhongsan Daxue Xuebao, Ziran Kexue [Bull. Sun Yatsen Univ. Nat. Sci.] 2: 25. pl. 7. 1959) had described a new species, *Ternstroemia subrotundifolia*, from Kwangtung and had cited *Tsang* 25486, already mentioned above, as the type of his species. What startled me even more was that Chang mentioned the fruit as 5-locular with a single seed in each locule.

Since the Tsang collection was made under the sponsorship of the Arnold Arboretum and is not yet distributed, four duplicates of *Tsang* 25486 have been available for my study, thus affording an opportunity to make several dissections of the fruit without destroying the value of the specimens, which, after all, are isotypes of Chang's species. My findings are recorded in the table which follows:

MATURE FRUIT OF *Tsang* 25486

NO. OF LOCULES	NO. OF SEEDS	SEEDS IN LOCULES
3	7	4-2-1
3	6	2-2-2
3	5	2-2-1
3	5	2-2-1
4	7	1-2-2-2
4	5	2-1-1-2
5	7	1-2-1-2-1

In the seven dissections made from this single collection, the fruits were found to have either three, four, or five locules, with three the dominant number. The total number of seeds for each fruit varied very little, usually five or seven with only one fruit showing six seeds, two to each of the three locules.

Chang in his description (both Latin and Chinese) gives the fruit as 5-locular, with a single seed in each locule, an arrangement which I did not find in any of my observations. Since Chang was working with a duplicate of the same collection (*Tsang* 25486) with which I have worked, we can only assume that his finding was made from a single dissection and that his finding, although quite ideal, is mere chance.

The style, being quite short, may persist unbroken into the fruit. It is

quite thickened at the base and then divides into three, four, or five short branches. In the dried fruit, the branches are usually pressed down, brittle, and difficult to separate. I do feel, however, from the examination of the material available that the number of branches of the style is the same as the number of locules in the ovary or fruit, a conclusion which is logical rather than observationally accurate.

This occurrence of varying numbers of locules in the fruit obviously shows that an evolutionary change is taking place. In all of the material of *Ternstroemia* which I have studied from the Eastern Hemisphere I have found only one other variant from the 2-loculate ovary and fruit. *Ternstroemia patens* (Korthals) Choisy, a very rare plant of Sumatra, is 1-loculate in both flower and fruit. Furthermore, a single pendulous ovule is found in the ovary, and a single seed in the fruit. One may consider this the extreme in development.

It is possible that *Ternstroemia kwangtungensis* represents a more primitive taxon of the genus in transition from a 5-loculate to a 2-loculate state. The two sterile locules in the undeveloped fruit of the type might be considered further evidence of this transition.

As far as I know, this taxon has been collected only three times and only in Kwangtung. The type was collected by Merrill at Lofaushan, an area well known botanically, about 60 miles east-northeast of Canton ($23^{\circ} 15' N$, $114^{\circ} 8' E$). Tsang (25486) collected the type of *Ternstroemia subrotundifolia* at Linfashan ($22^{\circ} 59' N$, $115^{\circ} 20' E$), which is about 75 miles southeast of the Lofaushan. Both of these specimens I have examined. Chang cited a third specimen (*H. Tse* 608) collected at Yingtak ($24^{\circ} 10' N$, $113^{\circ} 5' E$), located about 80 miles west-northwest of Lofaushan. These three collections extend over a distance of 150 miles. In well-collected Kwangtung, it seems strange that it has not been encountered more often, since Tsang commented in his field notes that it was "fairly common."

Below is recorded a nomenclatural treatment with an amplified description.

Ternstroemia kwangtungensis Merrill, Philipp. Jour. Sci. Bot. 13: 148. 1918. — Melchior, Nat. Pflanzenfam. ed. 2, 21: 141. 1925.

Ternstroemia subrotundifolia Chang, Zhongsan Daxue Xuebao, Ziran Kexue (Bull. Sun Yatsen Univ. Nat. Sci.) 2: 25, pl. 7. 1959 — *syn. nov.*

DISTRIBUTION: China (Kwangtung).

KWANGTUNG: Loh Fau Mountain (Lofaushan), in damp, forested gorge, alt. ca. 300 m., *E. D. Merrill* 11013 (A, lectotype* of *Ternstroemia kwangtungensis*), Aug. 29, 1917; Hai-fung Distr., Lin Fa Shan, Pak Shui Chai, *W. T. Tsang* 25486 (A, isotype of *Ternstroemia subrotundifolia*), Aug. 15–24, 1935 (scattered shrubs, fairly common, 3 ft. high; fruit red).

* The original holotype, deposited in the herbarium of the Philippine Bureau of Science, was destroyed during the Second World War, hence this designation of a lectotype.

Shrub or small tree, 1–4 m. high. Branches and branchlets stout, 5–7 mm. diameter, rugose, reddish brown, the petiolar scars prominent. Leaves thick-coriaceous, elliptic-ovate to suborbicular, 7–9 cm. long, 3–5 mm. wide, rounded or obtusely acuminate at the apex, obtuse or broadly cuneate at the base, dark green above, tawny or reddish brown and dark-punctate beneath, the margin glandular-denticulate, especially along the upper half on younger leaves, less obvious on the older leaves, the midrib canaliculate above, plane or lightly elevated below, the primary veins 5–7 pairs, quite indistinct, curving upward near the margin, the petiole robust, 1.5–2 cm. long. Flowers not seen. Fruit axillary, solitary, depressed-globose, 1–1.6 cm. long, 1.2–1.8 cm. diameter, 3-locular, occasionally 4- or 5-locular, 5–7-seeded, the seeds conduplicate, 7–8 mm. long, ca. 6 mm. diameter, covered with a tawny, mealy aril; fruiting style short, thick, 1–2 mm. long, branching near the apex, the style branches apparently equalling the locules in number, each branch topped by a small capitate stigma; fruiting pedicel stout, 1–1.5 cm. long, ca. 3 mm. diameter; persistent bracteoles 2, opposite, immediately below the calyx, broadly ovate or deltoid-ovate, ca. 3 mm. long, 4–5 mm. wide at the base, the margin scarious; persistent calyx-lobes rounded, ca. 6–7 mm. long and wide.